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the navy has been so distinguished. The plan which he propounded was, as you know, to proceed in ships to Smith Sound, at the head of Baffin's Bay, and, leaving them there in safety, to explore northwards along the west coast of Greenland in sledges and boats. This plan, in addition to the various good scientific results to be obtained, has the further merit of calming the fears of the timid, who dread a repetition of the sad catastrophe of Franklin, by showing them that there is no analogy between his expedition and that by which it is now contemplated to reach the North Pole. The former was an effort to force a passage with ships through landlocked icy channels; that of Sherard Osborn is to avoid all such danger by advancing in sledges from ships placed in safe stations; it being a fact that amid the many sledging-parties who traversed thousands of miles upon the ice in search of Franklin not a life was lost. The other project, or that which has been advocated by the accomplished geographer Dr. Petermann, is to try to reach the North Pole *via* Spitzbergen, getting through the pack-ice to the north of that island in a steam-vessel. His first letter on this subject was partially read at a former meeting, and was published at length in weekly newspapers; but when it came under our consideration, the time of the assembly was so much occupied in discussing the natural history questions which the ethnological memoir of Mr. Markham elicited that naval officers and other Arctic explorers who were present were debarred from delivering their opinions on the relative merits of the two plans. Since then Dr. Petermann has addressed a second letter to me on this subject, which will first be read, and then the naval officers are expected so to express their opinions as to enable the Councils of the Royal Geographical Society and of the other scientific bodies who advocate a North Polar expedition, to adopt that which they consider the best scheme for the accomplishment of this great object. Now, although I know that there are differences of opinion among the Arctic officers who are present as to which of the two plans offers the best line of research, let me assure this meeting that these gallant men are united in the belief that, if a well-fitted expedition be sent out, success would crown the effort. They well know that the accumulations of floating ice, which in old times were considered impassable barriers, have been traversed by ordinary sailing-vessels, and that in the memorable Antarctic voyage of James Ross packs of ice several hundred miles in width were passed through, that intrepid navigator reaching an open ocean beyond. The question, then, to be debated this evening is, whether the sledging expedition to the north of Smith Sound and along the west coast of Greenland, or the effort to traverse the pack-ice to the north of Spitzbergen, or the most northern point reached by Sir Edward Parry, is to be preferred, it being recollected that in the days of the last-mentioned great navigator steam power had not been applied to ships. Happily we have still among us distinguished Arctic explorers who have been both in the seas of Spitzbergen and those of Baffin's Bay; and I am sure that we shall obtain from them such a hearty concurrence in our scheme as will, with the appeal of the other men of science, induce the British Government to fit out a well-found North Polar expedition, which, in advancing several branches of science, will sustain that spirit of adventure which has always been the mainstay of our maritime greatness.

The first Paper was as follows—

1. *Second Letter to Sir Roderick I. Murchison, on the subject of North Polar Exploration.* By Dr. A. PETERMANN (Honorary Corresponding Member R.G.S.).

THIS letter was intended as supplementary to the first communication of the author on the same subject, and to adduce further facts

and arguments on certain points which, in the former letter, had been touched upon too briefly. The sea round Spitzbergen, the writer repeated, was much larger than Baffin's Bay, or any other Arctic Sea yet visited by English Expeditions, and could, as to its extent, be compared only with equivalent portions of the Antarctic Basin. Could any reason be adduced, however slight, why it should be more difficult to sail from Sir E. Parry's furthest in $82^{\circ} 45'$ to the North Pole and back, than up Baffin's Bay from Cape Farewell to Disco Island, or from Davis Strait to Smith Sound, or from Goodhavn to Wellington Channel?—all being the same distance of about 900 miles. It is well known that the flocs which drift down upon Spitzbergen from the north contain in their embrace no icebergs proper, nor any such heavy ice as is found in Baffin's Bay, or even in Davis Strait. The supposition that there existed in the sea between Spitzbergen and Novaia Zemlia an ice-barrier, preventing well-appointed vessels from proceeding in that direction northwards, he had before shown to be a mere fiction and prejudice. His desire was, however, to draw attention to the facts—1, that even in the highest latitudes, and where ice-masses in the form of drift-ice, pack-ice, and bergs are developed and accumulated to the greatest extent, only a small portion of the sea, comparatively, was occupied by ice, by far the larger portion being free from it and perfectly navigable; 2, that even the most prodigious ice-masses, such as those occurring in the Antarctic Sea, offer no serious obstacles to an exploring expedition in a sea of any extent, like that of Spitzbergen. These ice-masses are, moreover, of an ever-changing, drifting, and dispersing character. Sir James Ross found the pack-ice to change its place entirely within the short space of a few weeks: thus in the latitudes where, in January, 1841, he had to bore through a heavy pack 130 miles in width, he found, on his return in the beginning of March, nothing but an entirely clear sea; and in the same way, further east, where in February, 1842, he encountered that tremendous pack 500 miles in extent, he found, only four weeks later, the sea perfectly clear and open, and almost entirely free of ice. There is, indeed, in no Polar sea of any extent, even right under the Pole itself, any such thing as an ice-barrier that may not be successfully overcome by an expedition such as would be sent out at the present day. A new expedition to the North Pole by way of Spitzbergen might leave port about the 1st of March, before the drifting masses of ice from the Siberian shores encumber the Spitzbergen seas; it would then have the chance to sail, under favourable circumstances, in one stretch to the North Pole, perhaps in three or four weeks, and arrive there at the beginning of the

Polar dawn and summer. Within the six summer months the whole western—the American—boundary of the Arctic Basin, from the northernmost known point of East Greenland to Behring Strait, might be reconnoitred, the Asiatic boundary of it being already tolerably well known by Russian research. In September or October one of the vessels might be sent home with tidings of the season's proceedings, the other remaining for the winter in a spot as near as possible to the Pole, in order to make scientific observations by which the keystone would be added to our whole meteorological system of the Northern Hemisphere; the second vessel returning in the spring. In the harbour of Spitzbergen, in lat. 80° , the expedition would have a fixed base for constant communication with England, attainable all the year round from the Thames by a fortnight's sail.

Admiral SIR GEORGE BACK began his remarks by observing that Dr. Petermann's plausible and very interesting paper had much to recommend it. It is true that there is a current setting to the north between Nova Zembla and Spitzbergen; it is true that Spitzbergen is within 2400 nautical miles, or a little more, of England, and that it is accessible from very early summer to late autumn, but not always; it is equally true that it has capacious harbours, where vessels may find shelter or pass the winter. It abounds in reindeer, in Arctic hares, in myriads of birds, all good to support life; but no man can pretend to say or foretell (for the attempt has never been made) how far the best-equipped steamer, commanded by the most able Arctic officer, could penetrate into the sea to the north of it, through such occasional openings as the current or the winds might produce. As to Dr. Petermann's observations with regard to the sea west of Spitzbergen, that the ice drifts to the south frequently for a great portion of the year and that the effect of the "Atlantic" sea was to break up the ice at the edge of the pack, this is, to a certain extent, true; but, that an expedition could make any better progress towards the North Pole from the west of Spitzbergen, he absolutely dissented from. He grounded that dissent on his own experience acquired in the expedition of the *Trent* and *Dorothea* in 1818, in which he served under his friend and gallant commander Franklin, accompanied by Beechy and Buchan. It was the first expedition that sailed from England in the present century. They tried for a long time, night and day incessantly, to force their way to the north. The ships were greatly damaged, the men exhausted, and, notwithstanding all their efforts, they were not able to get beyond $80^{\circ} 30'$. Then, again, the ice there is not like the ice westward. It is in immense floes or fields, some of them 5 miles in diameter, and many of them 40 and 42 feet in thickness, elevated 2 or 3 feet, but sometimes not so much, above the surface. One of the ships, the *Dorothea*, was once separated from the *Trent* by the rotatory motion of the floe until she was scarcely visible. Afterwards she was crushed and rendered hardly seaworthy. The expedition then went along the edge of the pack-ice from Spitzbergen towards Greenland, until it was arrested by the impenetrable ice off the coast of Greenland. In all that distance there was not an opening of half a mile deep,—no lane, no passage, nothing by which even a steamer could have entered. Seeing this, and the season being far advanced towards the end of September, they were compelled to give up the attempt and return to England. Dr. Scoresby, who was formerly captain of a whaler, and the most scientific man of his time in his profession, told him that

he once got as far as 82° , but he never found a second opportunity of advancing so far north. As to the expanse of sea eastward of Spitzbergen, which has not yet been tried with steamers, that route offered very great advantages. Referring to Captain Sherard Osborn's plan, he would only say that, if the two vessels he proposes should be fortunate enough to find an open sea—that is, open water—with ice so loose that vessels may sail amongst it; and if they should be able to take up their respective winter stations in Smith Sound; and if the following winter should be not open but extremely close, the ice wedged and immoveably fixed; then he saw no reason in the world why a party equipped in the able manner described by Captain Osborn should not succeed in getting very near to the Pole, if not to the Pole itself,—contingent, however, on not finding any large space of open water; for, in that case, it would be fatal to the expedition.

Admiral SIR EDWARD BELCHER knew personally what sledge-travelling was, and he had seen the difficulty of meeting open water on such a trip. He saw, also, great difficulty in carrying a vessel round to Smith Sound to commence with. They knew on several occasions Government expeditions had failed in that, and he believed the practicability of going up Davis Straits and of getting up to Smith Sound, in the hope next year of going thence further north, was very doubtful. With regard to the expedition to which Sir George Back had alluded, the question was, did they go the right way? He (Sir Edward Belcher) thought they kept too much towards Greenland, and that they were seeking for whaling-ground, and not to advance the cause of science. In that they made a great mistake. He had no doubt that if Scoresby had pursued a course to the eastward of Spitzbergen he would have drifted round the Pole. As regarded the sledge system, he much doubted its feasibility. Granted that they secured the vessels the first year, and that sledging operations were duly prepared: if the sea was open in May, as he believed it would be, he would ask if their sledges were to be boat-sledges, fit to pass over open water. If so, the attempt was wilder than that of Parry; and both Richards and Osborn well knew the difficulty attending any such operation. Sir James Ross was accustomed to say that no one could comprehend the severe labour imposed on the men when those boats got into snow. They were to be unloaded, and even then they could scarcely be extricated. On some occasions, when the snow had melted, they were detained for hours, not advancing a mile in two days. He (Sir Edward Belcher) met Baron Wrangel at Petropaulovski in 1826, after his unsuccessful exploration by dog-sledges; and his simple observation, "What could we do when we met with water?" was just what he would put to the sledge projectors. On the other hand, if vessels were sent to Spitzbergen, they would be able to finish and report, if not successful, in one season; recruit and start afresh, as Ross did, in the second; and eventually, he had no doubt, they would be able to go to the Pole and back and return to England within six weeks.

Admiral COLLINSON said in the observations which he was going to lay before the meeting, he should wish it to be understood that they should be received with caution, because his experience as a Polar navigator, with the exception of a short voyage in Antarctic regions, had been in that portion of the Polar Sea which is confined by land. He thought, however, he had in that exploration acquired some information which would be useful to the Society in determining the important question as to the route which this Polar expedition ought to take. The theory of an open Polar sea had its origin in the remarkable journey of Baron Wrangel from the coast of Asia. It received confirmation in the exploration which was undertaken by Sir Edward Belcher to the northward of Parry Islands; and further, again, in the open water that was seen by Morton, in Kane's voyage, beyond the northernmost point that had yet been reached in Greenland. But are these not simply open holes, rather than extensive seas?

He took his own experience to guide him. In passing from the farthest point reached by Dr. Rae to Gateshead Island, his sleigh sank through the ice, and his party were obliged to make a great *détour*, notwithstanding that they had passed through a temperature that season lower than what was experienced by Sir Edward Belcher to the northward. He had here a perfect knowledge that no open sea was in sight, and yet this action took place. It could only be accounted for by the tides acting upon the ice that was aground. That fact he brought forward as an answer to the first proposition. The second, and the other question that had been so prominently brought forward in Dr. Petermann's Paper, is the drifting of the ice. The feeling of persons generally is, that because the ice wastes away there must be an open space at the back of it. He (Admiral Collinson) contended that this was without foundation, for it was proved by the drift of ships that have come down Baffin's Bay, that vessels have been brought out to the open sea without occasioning any opening of the sea behind them. He would call attention to the drifting down of the *Fox*, which vessel came down to the sea, and gradually, as she approached the sea, her progress increased day by day; while we had the positive record that the *Advance* and *Rescue* came down very slowly; and we know that the *Resolute*, that was further back in the pack, made no progress at all until the summer came on. The great question that arises here is, How is it that this drifting of ice takes place without leaving a vacuity behind it? He thought it was sufficiently accounted for by that pent-up force which is brought on in the first place by the wind acting upon the ice, and driving it up. We know what effect that force has, by seeing the manner in which the ice is piled, sometimes as much as 40 feet high, as Sir George Back had just informed the meeting. It should also be remembered that during the winter, as the ice is making, it occupies a larger space than the water from which it is made; and immediately it is set free from the shore, which it is by every spring-tide, it forces its way down; and therefore we have that remarkable phenomenon, a downward drift, without any open sea left behind it. This is not only shown by the drift of the *Fox* and the *Advance*, and by the *Resolute* remaining stationary, but it was also shown by Sir George Back, in the *Terror*, in the Fury and Hecla Straits, in Prince Regent's Inlet, where he was brought down 300 miles, and where we know that former voyagers had never seen open sea. These facts, in his opinion, disposed of the theory that, because there was a continual outlet, the ice leaves an open sea behind it. Regarding the comparison which had been instituted by Dr. Peterman between the Arctic and Antarctic seas, he (Admiral Collinson) contended that these two seas were not similar in their character in any way whatever. In one we have the most open expansion; in the other it is pent up by continents, with one small vent to the westward, and two partial openings to the eastward. This explains why the argument fails in which you are encouraged to go to the Pole by way of Spitzbergen. When we have got to Spitzbergen, we have indisputably got through a barrier of ice like that which Ross, by great energy, penetrated to the southward; and, when you get beyond that, you have to meet with what he met with in latitude 78°—an icy wall. For this reason he contended that our exploration had better be taken by Smith Sound than by Spitzbergen. You have undoubtedly an opportunity of getting nearer to the Pole by sea; but he adhered to the principle which Parry enunciated, that if you want progress in the Polar Sea, you must hold by the land. We are told that Sir James Ross broke through the icy barrier, and succeeded in penetrating into an open sea. Why did he get there? Because there was land beyond him, and that land was the limit of the expanse of the ice. It was because there was land there that he was enabled to reach that expanse of water. We are all desirous that this expedition should take place, and look upon it as one that will add to the honour of our country. We cannot do

better than take up the particular expedition which has been proposed by Captain Sherard Osborn.

Admiral OMMANNEY fully concurred in the views set forth by Dr. Petermann. It was not a momentary conviction, for the idea had been in his mind during many years of Arctic service, and he was perfectly convinced that the most feasible way of getting at the Pole is to make Spitzbergen the base of our operations. His objection to Smith Sound was that it is not so easy to get there; Davis Straits and Baffin's Bay are generally blocked up with ice, and before a vessel can get up there in the summer the ice must break up; but in some seasons it does not clear away. In 1836, when the speaker was in Baffin's Bay with Sir James Ross, not a ship got to the northward of Disco Island. We know that M'Clintock was baffled the first year in attempting to penetrate through the middle ice of Baffin's Bay. We know also that H.M.S. *North Star* could not get into Lancaster Sound. In 1850 he (Admiral Ommanney) was himself beset six weeks in the pack of Baffin's Bay, and thus lost the best part of the summer in their search for Franklin. In whaling expeditions, too, there is not a year that some ship is not lost in attempting to get through Baffin's Bay. It would, therefore, be a matter of great uncertainty to reach Smith Sound, in the first instance, to commence the proposed exploration. The expedition of Kane shows that Smith Sound is a most dangerous point in an Arctic expedition. A barrier of fixed ice formed round his wintering quarters, shutting him up for two winters, and from this he never extricated his ship. The advantages which would attend making Spitzbergen the base of operations, which Smith Sound does not offer, are numerous. There is an open sea round it. We have ready access to a place of perfect security for our operations; there is a safe winter harbour at Spitzbergen; and we should be able to establish a safe dépôt, build houses, and live there, if necessary. From this secure base we could watch our opportunity for penetrating the ice at a more northerly point than could be reached in any other quarter. Spitzbergen can be reached with perfect certainty every summer, and regular communication could be held with England, whereby the people here could know how the expedition was going on, in case operations were extended beyond one season; a facility which is not offered in Smith Sound. In the event of any disaster happening on the road to the Pole, we could much more easily fall back upon Spitzbergen than we could upon Smith Sound. The argument generally adduced is that Parry failed in his expedition from Spitzbergen; but we have never yet had an expedition properly formed to make an exploration from Spitzbergen to the North Pole. Parry's expedition was merely one that went a summer trip. The other expeditions were abortive expeditions, merely for making a north-east or a north-west passage. Parry's expedition was fitted to make a sort of boat and sledge journey. What did he do? He travelled at the most unfavourable season of the year for sledge-travelling; and the ship was left at the most favourable season of the year for navigating and exploring the Polar Sea. We learn this from Parry himself, who, after his return from this expedition, wrote a letter to point out the cause of the failure, and to recommend that a ship should go to winter in Spitzbergen, whence the party would make the sledge-travelling in the most favourable season of the year, that is between March and June. Now, we can go with certainty to Spitzbergen; and we can put our ship into the most secure and perfect harbour—Hecla Cove—in latitude $80^{\circ} 30'$. We can now enter the Polar Sea with a new element in arctic navigation, a screw steamer, carrying sledges and light boats to use if requisite. Even if we put aside the question of penetrating the ice with a ship, and look to sledge-travelling, we are certainly in an infinitely better position to do sledge-travelling from Spitzbergen than from Smith Sound; but the ice is probably not of a permanent and favourable nature

for depending on a sledge journey. We have all heard what a delightful trip it is for yachts to go to Spitzbergen in summer. They go there with perfect ease as far as 80° N., and have a pleasant cruise. If that is the case it is surely one of the best grounds for having the expedition from Spitzbergen. He (Admiral Ommanney) was quite satisfied that had a screw steam-vessel been at the service of Parry in his sledge-journey north of Spitzbergen, he would have gone as far in three days as had taken him forty-eight days on the ice. If an exploration of the Polar region is to be undertaken in the interest of science, look at the great advantage of going in a ship carrying officers and scientific people with everything to hand, compared with what could be done in the confined accommodation of sledges. General Sabine, the companion of Parry in Spitzbergen, and now the President of the Royal Society, is a strong advocate for the Spitzbergen route. He spent several months in Spitzbergen when accompanying Clavering's Expedition, carrying on scientific investigations, and during this time he killed with his own gun fifty deer; this abundance of food was another argument in favour of this route. Moreover, the coasts abound with drift-wood and trees. There are many eminent voyagers in favour of this route, and he would read the opinion expressed by Dr. Scoresby in his work. When he got to $81^{\circ} 30'$ N. he found a large stretch of water extending 300 miles, and he observes, "Had it been my object, I might have penetrated to a considerable degree towards the north; but prudence dictated my return." The influence of the Gulf Stream probably extends past Spitzbergen into the Polar Sea. When he (Admiral Ommanney) commanded in the White Sea, a cask of claret was picked up in the sea off Cape North; it was covered with barnacles and weeds. This flow of warm water into the Polar Sea will be favourable in creating open spaces of water through the ice for steam-vessels to penetrate. In conclusion, he would say that it was not generally known that the Swedish Government for the last few years had an expedition stationed at Spitzbergen engaged in measuring an arc of the meridian. In connection with this survey, the officers aspire to make an expedition to the Pole. This country, he hoped, would never allow another nation to anticipate us in this great discovery, after all we have done in expeditions to the Arctic regions.

Admiral FITZROY had no pretensions to the character of an Arctic navigator, never having been within the Arctic seas; but from the time when Parry, Sabine, Ross and others of that day began their explorations, he had always paid careful attention to the progress that was made from year to year. The result of his own humble gleaning on the subject had been that a great deal too much stress had been laid, proportionately, upon attempts to make passages by the North-west, and that we had not given sufficient attention to what had been done by the early Dutch, English and Russian navigators: those who in the latter part of the fifteenth century, and in the sixteenth and seventeenth centuries, made very successful attempts to reach to the north and eastward, and also very near to the North Pole. He would invite attention to a book written by Daines Barrington and Colonel Beaufoy, published first in 1773, and republished in 1818, about the time that the polar voyages were revived in this country. It is well known that Daines Barrington and Colonel Beaufoy were Fellows of the Royal Society, and that the papers which they read contained the best information known at that time. Some of the passages give what he (Admiral Fitzroy) firmly believed to be perfectly credible accounts of Dutch ships having reached to within two or three degrees of the North Pole, having found there open sea, a comparatively warm temperature, a swell and roll of the sea indicating that there was no barrier within any moderate distance. One ship, of which the journal is given in great detail, reached to 88° N. lat.; and Captain Jansen, Maury's friend—and he was proud to say, his own friend—who was in this country

very recently, told him he had inspected the journals of several of these Dutch ships, which are printed and carefully kept in Holland, and that he had no doubt of their accuracy and credibility. It may not be generally known that the object of the Dutch in those days was to pass round what they considered then the shortest track to the East Indies by the Arctic Sea. It was in making these voyages that some of the ships went so far north between Spitzbergen and the northern part of Asia to the eastward, and that the sea was partly explored near the Pole. There was one instance, which is given in detail, of a ship having gone two degrees beyond the Pole. Those ships had quadrants—it was at the beginning of the time when quadrants were used; there appears to be no reason for doubting their latitude. But there is a remarkable fact connected with the exploration of the Arctic regions in this century, that the narrow waters and the most blockaded parts have been explored to the utmost, while the wide open sea, that which was found navigable during the three previous centuries, and found open by the best accounts even to within a few degrees of the Pole itself, should have been utterly neglected,—that we should have made no one attempt during the whole of this century to explore that part of the Arctic Ocean between Spitzbergen, Nova Zembla, and the Pole. That there is little or no land about the Pole itself, the instances which have been mentioned this evening of no masses of fresh-water ice having been found to the northward of Spitzbergen, afford a sufficient proof. The icebergs which are of comparatively small size, as compared with those in the Antarctic regions—are piled up, one piece upon another; showing that that ice was formed upon the sea and not upon the land, as the great icebergs are formed upon the faces of glaciers, which break off from time to time, or, as whalers say, are “calved” from the cliffs of the glaciers. Such being the case, the ice coming from these Arctic regions being all of one character—there being no large masses—is a strong presumption that there is only water there. That that water must clear a way during the summer, or during part of the year, through these straits, is clearly shown by these masses of ice constantly coming away every winter. If one considers what would be the natural consequence of a globe, like our earth, covered entirely by water and loose masses of floating ice: as the earth rotates, such masses of floating ice would have a tendency to go from the two poles towards the equatorial parts—water having a tendency to keep its own level, and ice having only a tendency to move on when once put in motion. A familiar illustration of the matter would be the twirling of a mop. But the imagination can picture a globe or a mass covered with water and ice, in which the polar particles would have a tendency to move away. That is a step towards the formation of these great icy barriers. How is it that round the Arctic region, and more particularly round the Antarctic regions, there is a line of ice commonly called “barrier”? There must be some cause that drives these masses of ice from the polar centre towards the circumference in every direction, checked somewhere by land, or by the swell of winds coming from the equatorial regions (winds blowing from a polar direction, raising little or no swell, from their confined limit)—the swell from the equatorial regions continually beating against this great barrier and keeping the ice from moving further away from the Pole. That may be advanced as a reason for the existence of the great barrier of ice round the Antarctic region, and for a considerable barrier round the north polar region. But within that barrier there is every reason for the supposition that there is water, and not land, within a considerable space near the North Pole—probably near the South Pole also. But on the subject of the South Pole, he would refer to one who has done more for the general information of the maritime community, not of this country only, though perhaps more for this country than for any other, not excepting his own—the

celebrated Maury, whose works may be read with profit and pleasure again and again. The Antarctic regions happen to have been one of the subjects of Maury's particular study. And among the points connected with it is the very curious fact of the barometer falling lower and lower as you get nearer to the South Pole from the tropic; the average height of the barometer becoming less and less, showing a state of atmosphere near the Southern Pole very different from that in equatorial regions, and connected with the movement of the ice away from those places. In the Arctic regions there is a similar characteristic. Those points Captain Maury is able to give you information upon. But the simple result of his consideration for many years, and the result of his (Admiral FitzRoy's) humbler study, was that there is open water at and near the North Pole; and that there is a great deal of open water, with also a large extent of continental land, near the South Pole; and that we shall be wanting in our duty as a nation, and shall be wilfully wasting the energies of those young men who are anxious and willing to go again to explore these most interesting regions, and important, too, in a commercial sense as well as in a scientific one, if we do not support the efforts of this Society, and follow the lead of the President whom we all esteem and honour so truly, and assist to the utmost of our means in forwarding the object which he and the Society have in view.

The PRESIDENT: Admiral Fitzroy, I am a practical man; and in endeavouring to elicit opinions right and left, I understand from what you have said, that you are in favour of the Spitzbergen route. Are you in favour of the Spitzbergen plan or the Smith Sound plan? Allow me to put that question to you as a geographer to whose opinion I attach great value.

Admiral FITZROY: Entirely so. To Spitzbergen in the first instance, as a base of operations; then from Spitzbergen, at the most convenient period, to the north, and round the North Pole.

Captain MAURY was in favour of the Smith Sound plan. If he had not studied the subject before, and had come here for the first time to listen to the reasons *pro* and *con* for the two routes, he must say he should have generally voted in favour of the last speaker, whether he was for one route or the other. Very good reasons have been given for both, and there have been many objections raised on account of the difficulties. To his mind, there are difficulties by both routes. The main question—the practical question—now is, by what route can those difficulties be best overcome. He clearly thought by that route which, in the good sailor-language, will enable us “to hold on to what we get;” and that, he feared, was not the Spitzbergen route. We may go by the Spitzbergen route, and penetrate into that fine open water, almost tepid, of which Sir Edward Belcher has spoken; but, at last, we are brought up to this impassable barrier of ice, and we have to come back again, and begin *de novo*. “We cannot hold on to what we get.” When we go by this other route, when we take Captain Osborn's two ships, when we equip those ships with all the means and appliances of modern times, and when we consider the distances that have been accomplished by sledging-parties, and not a life lost, he thought that that fact of itself was sufficient to show that the plan of planting your ships there in convenient positions, and of sending out these sledging-parties to establish depôts of provisions, and see how the land lies, and to come back and push forward again time after time—that that was the way to succeed. He thought Dr. Peterman had been unfortunate, together with those gentlemen who have followed him, in comparing the Antarctic regions with the Arctic on the score of ice. The climate of the Antarctic regions, as compared with the Arctic, is eminently marine. The Arctic region, surrounded in all directions by land, is continental. The winds which reach the Arctic Ocean come dessicated; they are dry winds; it is cold weather there. On the contrary, the winds which reach the Antarctic regions are moist winds; and

we have by comparison exactly the same contrast between the climate of the Antarctic regions and the climate of the Arctic regions that we have between the climate of the British Islands and the climate of Labrador and Canada in the same latitudes. Such is the difference that exists between these regions. Therefore, it cannot be argued that because Ross made that remarkable and astonishing progress through the icy barriers of the Southern seas, he could make like progress through the icy barriers which surround that open water to the north of Spitzbergen. We have heard some gentleman remark upon the number of disasters that annually occur among the whale-men in Baffin's Bay. It is true a number of disasters annually occur off those shores; but a number of disasters annually occur also in crossing the Atlantic. Vessels that go on these whaling expeditions are frail; they are not fitted out for Arctic exploration; but we find that those vessels have reached those very points that are now stated to be so difficult to reach. Kane's vessel, which he left in those regions, was a mere shell. He (Captain Maury) knew her well; she was wholly unfitted for Arctic exploration. She was not fitted to come in contact with, or even in sight of, an iceberg. However, in deference to the opinion of those gentlemen who support the Spitzbergen route, he should be very glad to compromise the matter by seeing expeditions sent to both.

Captain RICHARDS had listened with anything but satisfaction to the discussion he had heard. He had hoped to hear some well-founded comparisons between the two routes, but had been disappointed. Captain Sherard Osborn's paper and Dr. Petermann's to a certain extent advocated the same object—both advocated geographical discovery in the North Polar regions; but the character of the routes they advocate is as different as we may expect the result, to be from the adoption of either the one or the other. Captain Osborn has demonstrated the feasibility of reaching the Pole from Smith Sound by sledges: he has not only demonstrated the feasibility of it, but the certainty of it under certain conditions; and he (Capt. Richards) perfectly agreed with him, that if there is any considerable extension of Greenland or Grinnel Land to the north, or if there are firm floes to drag the sledges upon, we may get to the North Pole; this is certain, because we have gone much further already by the same mode of travelling. Capt. Osborn believes in the existence of those conditions, that land extends to the north and that he has got floes to go upon; but if he has not got fixed ice to go upon, he believes that, with a certain combination of ice and water, by sledge and boat, that he can get to the North Pole. And he (Capt. Richards) believed it also. Well, we will suppose that we have got to the North Pole, and come back in safety, and that we have explored the route to the Pole; then, he would ask, are geographers content? Because this is all they will get. It is much, but they will get no more. Every Arctic man knows well that there is a vast difference between exploring by sledges and exploring by ships. In exploring by sledges you go in a perfectly straight line; one sledge follows another in funeral procession—but perhaps with more solemnity and silence than are observed at most funerals; they must not deviate to the right or left from that straight line, if they can avoid it, because every mile they so deviate will be a mile added to the journey; and as sledges must be dragged by men who must eat, and can only carry a certain weight, there is manifestly a limit to sledge travelling. To get from Smith Sound to the Pole will probably require the whole resources of one ship. There will be six or seven sledges, and sixty or seventy men to drag them. It does not follow that the whole of the seven sledges will go to the North Pole; six out of the seven will go to enable the seventh to get there, and the six will fall off as soon as they have performed their particular function of feeding the seventh, and return to the ship one by one. Therefore the seventh sledge and ten men will be all that will arrive at the North Pole. He believed Captain Osborn's proposal to be the safest, and the

most certain one of reaching the Pole, so far as we know at present. We shall then have reached the North Pole and have explored the way to it, just in the same way as if any one started from London and walked to the Land's End in a straight line. If geographers are content with that, he had nothing more to say; but if they are not content with this, then they must turn to Spitzbergen. Captain Osborn has shown the way to the North Pole by sledges. Dr. Petermann says, "Explore the Arctic regions by ships!" It must be remembered that we have not been exploring the Arctic regions for the last twenty years, but searching for Franklin, who tried to make the North-West Passage, and that we have merely mapped the coast that our sledges unavoidably passed over. As one who had been engaged in the search for Franklin, he could assure the meeting that the idea of Arctic discovery never entered their heads at all. If any sanguine spirit thought of the North Pole, he did not dare to communicate the thought to his bosom friend. The man who was fortunate or unfortunate enough to discover the greatest amount of land, felt a kind of compunction in laying down that land, lest it should be inferred that he had deviated in the slightest degree from the great object in view. He (Captain Richards) had frequently felt this. If one-tenth of the force that have gone to look for Franklin had been employed in making geographical discovery, there would now have been nothing left unsolved. No sane man would in the present day think of going up Baffin's Bay, through Barrow's Strait or through Smith Sound with ships, in order to get into the Polar Sea. No one has ever succeeded in getting into the Polar Sea by this route. If Arctic discovery by ships is the object, there is only one route to go by, and that is between Spitzbergen and Nova Zembla. We have now no one to search for; our object is to complete geographical discovery in the northern hemisphere. If, as Dr. Petermann says, there is any extent of land round the North Pole, the same physical laws which are in operation in the South must obtain there; that is to say, there must be a certain barrier or belt of ice of greater or less extent thrown off that land at certain times, which must come south and dissolve year after year. If that be the case, any exploring expedition will simply have to pass through that barrier, as Sir James Ross passed through the same kind of barrier towards the South Pole, only that he did it without steam at all. On the contrary, if there be no great extent of land round the North Pole, which there is every reason to believe there is not, then, supposing the worst case, you can only have a frozen sea—a sea not navigable for eight months in the year. The ice decays in the month of June, and is broken up by the wind, rain, tide, and temperature, and forms again in due time just as regularly as leaves fall in autumn and bud again in spring. Consequently July, August, and September, would be navigable months in that region, and we should be able to reach the North Pole by ships; for instead of going seven miles a day, which is the fastest one can travel by sledges, we could perhaps go seven miles an hour. If there is no land to encounter, we should simply reach the North Pole in ships; but if there is land, we should winter there. If that land trends to the north, in the following spring we could get to the North Pole by sledges; and if that land runs to east or west, we could explore east and west 500 miles each way. An expedition would always have Spitzbergen to fall back upon—perhaps not 300 miles from your furthest point. Therefore, for the exploration of the Arctic regions by ships, Spitzbergen is the only route. He would be sorry that there should be any misapprehension with regard to any opinion he had expressed in regard to Captain Sherard Osborn's route. No man knew Captain Osborn so well as he did, or had a higher opinion of his abilities. But Capt. Osborn, it will be remembered, said distinctly that, apart from the object of reaching the North Pole, his great desire was that the seamen of Great Britain should be employed on an enterprise which, while it

reflected credit and honour on them, would also reflect lustre and renown on the country to which they belonged. With that opinion no one can disagree. Captain Osborn is far too unselfish a man, far too cosmopolitan in his feelings, to look with disfavour or jealousy on any expedition because the particular route to be adopted did not emanate especially from himself. But if an expedition were fitted out to explore the Arctic Seas to-morrow, and were placed at his (Capt. Richards') disposal, he would go from Spitzbergen most decidedly, and would make that his depôt and base of operations. In conclusion, he would only say that he had read Dr. Petermann's papers very attentively, and had never seen any views more clearly expressed, or defended by arguments more logical and convincing.

The second Paper was—

2. *An Account of the Mackenzie River District.* By R. MACFARLANE, Esq., of Fort Anderson, on the Mackenzie.

Communicated by SIR JOHN RICHARDSON, R.N., M.D., C.B., F.R.S., F.R.G.S.

THE banks of the Anderson at Fort Anderson, and for some distance below, are tolerably well wooded, pine (*i.e.* larch), juniper, birch, and willow being the principal trees, though the three last, especially juniper and birch, are scarce, as well as stunted in growth. Farther on, the wood is chiefly pine and willow, and is confined to the immediate banks of the river, while still lower down the country is entirely destitute of that article. In general, the banks are composed of clay, mud, gravel, shale, and probably also of sand and limestones. They are at first high and sloping, though the immediate ones are frequently low and flat. The timber required for this establishment had to be rafted down some 60 or more miles; there being no wood of sufficient size procurable in any quantity in this vicinity.

Having made a journey in February, 1863, between this and the supposed outlet of the Anderson, I then estimated the distance at fully 120 miles. We followed the river for the most part, and also made several long portages, which shortened the distance considerably. While in charge of Fort Good Hope, previously to the establishment of this place, I made several winter journeys to the Esquimaux, at the first group of houses near the outlet of this river; but as the weather during our stay was always blowing strong and drifting hard, I really could not say, from personal observation, that I had actually reached the coast. I believe, however, that I did, as the Esquimaux assured me of the fact. I need not describe their houses to you who, have seen so many of them; but I may mention that I found them (in January and February) very warm and comfortable. A long and low (covered) corridor, built of snow, shelters